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TO ALL WHOM IT MAY CONCERN:

Be it known that I, GREGORY J.H. HANSEN, a citizen of the United States of America whose post office address is 423 Ridgebury Road, Ridgefield, Connecticut 06877, have invented an improvement in a

MERCHANDISING COOLER HAVING LARGE  
PACKOUT AND SMALL FOOTPRINT

of which the following is a

SPECIFICATION

FIELD OF THE INVENTION

[0001] This invention relates generally to coolers and more particularly to a novel and highly effective merchandising cooler that maximizes packout (i.e., the amount of merchandise that the cooler can store and cool) and minimizes footprint (i.e., the floor space the cooler requires).

## BACKGROUND OF THE INVENTION

[0002] Conventional merchandising coolers utilize mechanical refrigeration to chill merchandise, such as food and beverages, which is best kept and sold at lower temperatures than the ambient temperature of the environment in which the items are sold. These conventional coolers operate according to the same general principles as a home refrigerator, and include a compressor, a pump, and a condenser coil. They are accordingly expensive, bulky, and inefficient. Further, these conventional refrigeration units tend to have a large footprint. Floor space in a retail environment can be scarce and costly; accordingly, these conventional arrangements fail to provide an adequate packout relative to their footprint. Mechanical refrigeration units can moreover be costly to maintain.

[0003] Recently, thermoelectric technology has been utilized in a wide variety of applications. Thermoelectric arrays are solid-state heat pumps that utilize one or more physical effects such as the Peltier effect and Thompson effect. In operation, direct current flows through the thermoelectric cooler, causing heat to be transferred from one side of the array to the other, creating a cold side and a hot side. The cold side of the thermoelectric array can be placed in or adjacent to a selected area or device for cooling purposes.

[0004] Thermoelectric cooling does away with the bulky coils and compressors used in conventional refrigeration. Thus, refrigeration can be supplied to places that do not accommodate conventional refrigeration systems. For example, thermoelectric cooling has been used successfully to cool integrated circuit (IC) components to improve their performance. More recently, thermoelectric cooling has been used to cool small, portable coolers. These conventional units include a 40-quart thermoelectric cooler sold under the trademark COLEMAN. While these units may provide a sufficient solution for use in a personal, home or travel environment, they are not equipped to provide the combination of large packout and small footprint that is desirable in a merchandising

environment. Additionally, the thermoelectric coolers known in the art do not adequately display the refrigerated goods offered for sale and are not designed in a way that enables efficient maintenance.

[0005] Therefore, a need exists for a small-footprint cooler that can hold a large quantity of merchandise, display it attractively to potential consumers, and chill it efficiently. Further, a need exists for a cooler with a cooling module that facilitates the efficient manufacture, maintenance, repair or replacement of the cooling module.

### SUMMARY OF THE INVENTION

[0006] According to an exemplary embodiment of the present invention, a merchandising cooler is provided that includes a thermoelectric cooling module having a supplemental radiator on the hot side and an insulated container having one or more transparent side or top portions that facilitate viewing of the contents of the insulated container.

[0007] Another exemplary embodiment of the merchandising cooler of the present invention includes a thermoelectric cooling module mounted in the top of the cooler and having a supplemented radiator on the hot side and an insulated container having a transparent top portion.

[0008] In further embodiments of the present invention, the thermoelectric module is mounted in various different locations in the top of the cooler, with one or more transparent panels in various sides or top portions of the cooler, and further, with opening mechanisms which are hinged, slidable, or can otherwise be opened to allow access to the contents of the merchandising cooler. In one embodiment, the merchandising cooler is configured to be mountable on a countertop.

[0009] The system and method of the invention provide a number of benefits. Thermoelectric cooling is less expensive and less bulky than conventional refrigerator

coolers used in the sale of goods. By virtue of the less bulky design, the merchandising cooler of the present invention can maximize packout for a given footprint. Additionally, the modular design of the thermoelectric cooling module of the present invention facilitates efficient manufacture and maintenance.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0010] For a more complete understanding of the present invention, the needs satisfied thereby, and the objects, features, and advantages thereof, reference now is made to the following descriptions taken in connection with the accompanying drawings.

[0011] Fig.1 is a basic diagram of an exemplary embodiment of the thermoelectric merchandising cooler of the present invention with a thermoelectric unit and transparent window in the top of the cooler.

[0012] Fig. 2 is a basic diagram of an exemplary embodiment of a thermoelectric merchandising cooler of the present invention with a thermoelectric unit mounted in the top and a transparent window in a side portion of the cooler.

[0013] Fig.3 is a basic diagram of an exemplary embodiment of a thermoelectric merchandising cooler of the present invention with a thermoelectric unit mounted in a side and a transparent window in the top of the cooler.

[0014] Fig.4 is a basic diagram of an exemplary embodiment of a thermoelectric merchandising cooler of the present invention with a thermoelectric unit and a transparent window mounted in a side of the cooler, intended for use on a countertop.

[0015] Fig. 5 is a basic diagram of an exemplary embodiment of a thermoelectric merchandising cooler of the present invention with a thermoelectric unit and transparent window in the top of the cooler, and illustrates an exemplary arrangement of key components of the thermoelectric module.

DETAILED DESCRIPTION

[0016] Preferred embodiments of the present invention and their advantages may be understood by referring to Figs. 1-5, like numerals being used for corresponding parts in the various drawings.

[0017] Fig. 1 shows a merchandizing cooler 10 according to an exemplary embodiment of the present invention. The merchandising cooler 10 includes a thermoelectric module 12 mounted at the top of an insulated container 14 (insulation is provided between outer and inner walls of the container 14). The thermoelectric module 12 may be purchased off the shelf from any of a number of conventional suppliers, as those skilled in the art will understand. The cooling capacity of the thermoelectric module 12 is selected with due regard to the expected ambient temperature, the volume of the space to be chilled, the temperature to be maintained within that volume, the thermal properties of the goods to be stored and displayed, and the insulating properties of the container 14, as those skilled in the art will also understand. The insulated container 14 is composed of materials that significantly impede the transfer of heat between the inside and outside of the insulated container 14. In this exemplary embodiment of the present invention, the insulated container 14 has a volume greater than 40 quarts and a footprint no greater than 580 square inches. The size of the insulated container 14 may vary for different applications, and the scope of the present invention is not limited to these exemplary dimensions. The thermoelectric module 12 may be secured to the insulated container 14 by screws, adhesives, or other conventional fastening means. The merchandising cooler 10 also contains a transparent panel 16 in its top. The transparent panel 16 facilitates the display of the contents of the merchandising cooler 10, and may be composed of glass, plastic, or some other transparent material. The transparent panel 16 may be hinged or slidable so that it can be opened to provide access to the contents of the merchandising cooler 10. Alternatively, it may simply snap into place.

[0018] Fig. 2 shows a merchandizing cooler according to another exemplary embodiment of the present invention. The merchandising cooler 20 includes a thermoelectric module 22 that may be mounted in the top of an insulated container 24. The thermoelectric module 22 may be secured to the insulated container 24 by screws, adhesives, or other conventional fastening means. The merchandising cooler 20 further includes a transparent portion 26 that facilitates display of the contents of the insulated container 24. The transparent portion 26 may be constructed to open to provide access to the contents of the insulated container 24. In the case of a large openable portion, such as the one shown in Fig. 2, hinges are preferred. However, a short-throw sliding mechanism is also possible. Alternatively, the transparent portion 26 may be fixed, and the container 24 may have an additional portion, not shown in Fig. 2, that may be opened to provide access to the contents of the insulated container 24.

[0019] Fig. 3 shows a merchandizing cooler 30 according to another exemplary embodiment of the present invention, wherein the thermoelectric cooling module is provided in a side of the merchandising cooler. The merchandising cooler 30 includes a thermoelectric module 34 mounted in the side of an insulated container 36. The merchandising cooler 30 also has a transparent portion 32 mounted in the top of the insulated container 36 that facilitates display of the contents of the insulated container 36.

[0020] Fig. 4 shows a merchandizing cooler 40 according to another exemplary embodiment of the present invention, which is configured to be mounted on a countertop. The merchandising cooler 40 includes a thermoelectric cooling module 44 mounted in a side of the merchandising cooler 40. Alternatively, it may be mounted in the top or any other portion of the merchandising cooler 40. The merchandising cooler 40 also includes a transparent portion 42 that facilitates viewing of the contents of the insulated container 46. The transparent portion 42 may be configured to provide access to the contents of the insulated container 46 by a hinged joint, sliding mechanism, or other means.

[0021] Fig. 5 provides a more detailed view of the merchandizing cooler 10 of Fig. 1. The thermoelectric cooling module 12 includes fans 51 and 56, heat exchangers 53 and 55, a thermoelectric array 54, and a supplemental radiator 52. In operation, direct current flows through the thermoelectric array 54 in a direction causing heat to be transferred from the cold side of the thermoelectric array 54, which is thermally exposed to the interior of the container, to the hot side of the thermoelectric array 54, which is thermally exposed to the atmosphere. The cold side comprises a first heat exchanger (heat sink or heat collector) 55; the warm side comprises a second heat exchanger (heat radiator) 53. A supplemental radiator 52 of the thermoelectric cooling module 12 is coupled to the warm-side heat radiator 53 and provides increased efficiency in evacuating thermal energy from the insulated container 50. The supplemental radiator 52 may comprise an array of fins in contact with radiator 53 or a coil through which a liquid is circulated. A fan 51 may be employed to circulate air over the fins or coil. The fan 56 is used to circulate air inside the insulated container 14 to facilitate the transfer of heat to the heat sink 55, which is chilled by the thermoelectric array 54. Thermal energy is dissipated in the atmosphere from the supplemental radiator 52 by the fan 51, which may be coupled to a vent in the top of the thermoelectric cooling module 12. This arrangement may be easily configured to chill the contents of an insulated container of the present invention to temperatures below 50 degrees Fahrenheit. In another embodiment of the invention, the hot and cold sides can be interchanged to warm the displayed merchandise.

[0022] The thermoelectric cooling module 12 is a self-contained and may include the elements 51-56 of Fig. 5 in addition to other elements. The thermoelectric cooling module 12 in any event must contain a thermoelectric array and two heat exchangers (a heat sink on the cold side and a heat radiator on the hot side). The complete thermoelectric cooling module 12 may be contained within a unitary casing or housing. This facilitates the efficient removal of the entire thermoelectric cooling module 12 from the merchandising cooler 10, for easy replacement and/or repair. The module 52 sinks down into a cavity in the insulated container, or the container has a built-up rim for receiving the module. In either case, the fit is snug, and insulation is provided around the

module and a lid for accessing the module, the interior of the container, or both. The module 12 can be on any side of the container 14, including the bottom, but is preferably in the top or a side wall. The self-containment of all components of the thermoelectric cooling module 12 also facilitates inexpensive and simple manufacture of the entire merchandising cooler 10. The thermoelectric cooling module 12 may be fastened to the insulated container 14 in a number of different ways. In various embodiments, the thermoelectric cooling module 12 is coupled to the insulated container 14 with the use of suitable means facilitating the removal of the thermoelectric cooling module 12, as explained above. Alternatively, the thermoelectric cooling module 12 may be fixed to the insulated container 14 in a more permanent fashion, as those skilled in the art will understand.

[0023] While the invention has been described in connection with preferred embodiments, it will be understood by those of ordinary skill in the art that other variations and modifications of the preferred embodiments described above may be made without departing from the scope of the invention. Other embodiments will be apparent to those of ordinary skill in the art from a consideration of the specification or practice of the invention disclosed herein. For example:

[0024] A drain can be affixed to the merchandising cooler so that ice can be added to the container, enabling the thermoelectric array to achieve even lower temperatures.

[0025] The device can be used either as an ice cooler or as an electric cooler or both at the same time; the bottom of the merchandising cooler or separate base on which it rests can accept wheels, casters, or other rolling devices for mobility or easy placement; the inside of the container can be provided with a ledge or arms on which a plastic disk or platform of some material can be placed to act as a false bottom; dividers can be placed or molded inside the tub to separate or divide product inside tub; the lid can be partly non-transparent (opaque or translucent) but have a transparent viewing area; pockets or areas in the container walls can be provided to accept blue ice packs, freeze bottles or an



ice substitute to aid in cooling; the outer walls of the merchandising cooler can be of one-piece construction taller than 24''; a full, printed graphic wrap can be secured around cooler, or graphic cards can be provided that slide into channels (i.e., the outer wall can be a sleeve, either spiral wound tubing, cardboard, plastic, or EPS foam, or other known construction, and a graphic wrap or graphic panels can be put around it or printed directly on it); gaskets, wheathersealing or rubber strip can be provided on the inside of the lid, on the container mounts, or both, to insulate and create a seal; the lid can comprise multiple panes; the tub can be formed with a taper; a separate crossbar can be provided that the motor/housing attaches to and the lid rests on or is hinged to on at least one side; the motor housing can have a lip that the lid rests on or hinges/attaches to; the lid can be hinged directly to the motor housing; the lid can be round with one flat side or formed as a dome; a separate base can be formed with an upward rim that extends vertically up over the above-mentioned sleeve and wraps the bottom of the sleeve; the sleeve and insulated container can be molded in one piece (rotational molding); the lid opening can be a cut-out surrounded by transparent material which is attached to rim, housing, or crossbar or simply rests over the edges of the rim; the thermoelectric array can be attached to the container on a first pair of opposite sides of a rectangular configuration with transparent lids providing access to the container on the other pair of opposite sides; lifts can be installed inside the tub to lift product up to a viewable or removable position; the thermoelectric array can be attached completely or partially externally and a vent can blow chilled air inside the tub; a tube or compartment can extend into or around the container or in the walls of the container, allowing chilled air to be injected into the container by way of holes, etc; and the container can be provided with a guide for an electric power cord, guiding it in a specified direction. The specification and the described examples are merely exemplary; the scope of the invention is indicated by the following claims.